



July 19, 1994

Ms. Julie Zakutansky
On-Scene Coordinator
USEPA Region V
Enforcement & Emergency Response Branch
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Chicago, Illinois 60604-3590

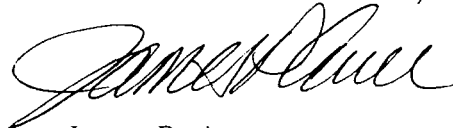
Dear Ms. Zakutansky,

Pursuant to your July 6, 1994 comments and as a follow-up to the facsimile copies transmitted to you on Monday July 18, 1994, Geraghty & Miller, Inc. has revised the Work Plan for the Phase II Site Investigation of Navistar International Transportation Company, Burlington Northern Railroad, and Iowa Interstate Railroad properties (Navistar/BNR/IIR site) located along the Sylvan Slough in Rock Island, Illinois. Enclosed please find three copies of the revised pages of the Work Plan.

If you have any questions related to the revised pages or require any additional information, please do not hesitate to call me.

Respectfully submitted,

GERAGHTY & MILLER, INC.



James P. Auer
Project Engineer

Enclosures(3)

cc: Jeff Cox, Esq./USEPA
Edith Ardiente/Navistar
Greg Jeffries/BNR
Elizabeth Hill/BNR
Cary Perlman/Latham & Watkins

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3.2 AERIAL SURVEYING AND LOCATION AND ELEVATION SURVEYING

All monitoring wells completed as part of the Phase II Site Investigation will be surveyed to provide horizontal and vertical data control. Elevations will be surveyed to the nearest 0.01 ft relative to mean sea level (msl). Horizontal locations for each of the monitoring wells will be determined to the nearest foot. In addition, an aerial survey of the site and site vicinity will be conducted to develop a local site topographic map.

3.3 PHASE II SITE INVESTIGATION REPORT

Subsequent to completion of Phase II Site Investigation activities, a Phase II Site Investigation Report will be prepared. This report will describe the equipment, methods, and techniques used to perform the Phase II site investigation work and will include the raw data generated, an interpretation of the data, and recommendations for additional investigative or removal activities, as appropriate. As indicated in the order, Geraghty & Miller, on behalf of the Respondents, will also submit monthly progress reports to the USEPA. These reports will describe all significant developments during the preceding period, including the work performed and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

3.4 DEVELOPMENT OF REMOVAL ALTERNATIVE

Based on the results of subsurface investigations conducted by previous investigators and the results of the Phase II investigation, Geraghty & Miller will conduct an engineering analysis of several potentially feasible source control alternatives for the Navistar/BNR/IIR Site. A brief description of Geraghty & Miller's technical approach for completing this task is presented in the following sections. An assessment of potentially available alternatives for the site, based on our preliminary review of the available site information is presented in Section 3.5.



Means Cost Estimating Guide, and unpublished data such as quotations from equipment vendors and service suppliers, and project notes.

The O&M costs cover post-installation activities required to operate the alternative, and include the costs for labor, parts, and other materials required to provide routine maintenance of equipment. Other O&M costs to be incurred include chemical and electricity needs for system operations, water and sewer service, and administrative costs.

3.5 PRELIMINARY ASSESSMENT OF POTENTIAL REMOVAL ACTIONS

Based on a preliminary review of available site information, Geraghty & Miller has made an initial assessment of the type of removal action that may be appropriate at the Navistar/BNR/IIR Site. The discussion presented in this section is intended to provide the USEPA with an introduction to the types of technologies that will be considered in the alternatives evaluation, and the general guidelines for system selection. The assessments presented herein are preliminary in nature, and are subject to change based on the results of the additional data collection activities and the detailed alternatives evaluation.

3.5.1 Production Recovery System

Groundwater at the Navistar/BNR/IIR Site is believed to have been affected as a result of former site operations, notably a diesel fuel release from an aboveground storage tank. The results of previous groundwater sampling have revealed the presence of dissolved BETX (benzene, ethylbenzene, toluene, and xylene) and PNAs, along with a floating layer of hydrocarbons, or non-aqueous phase liquid (NAPL).

Active recovery of the NAPL would require an engineered system that includes each of the following elements:

- NAPL recovery.



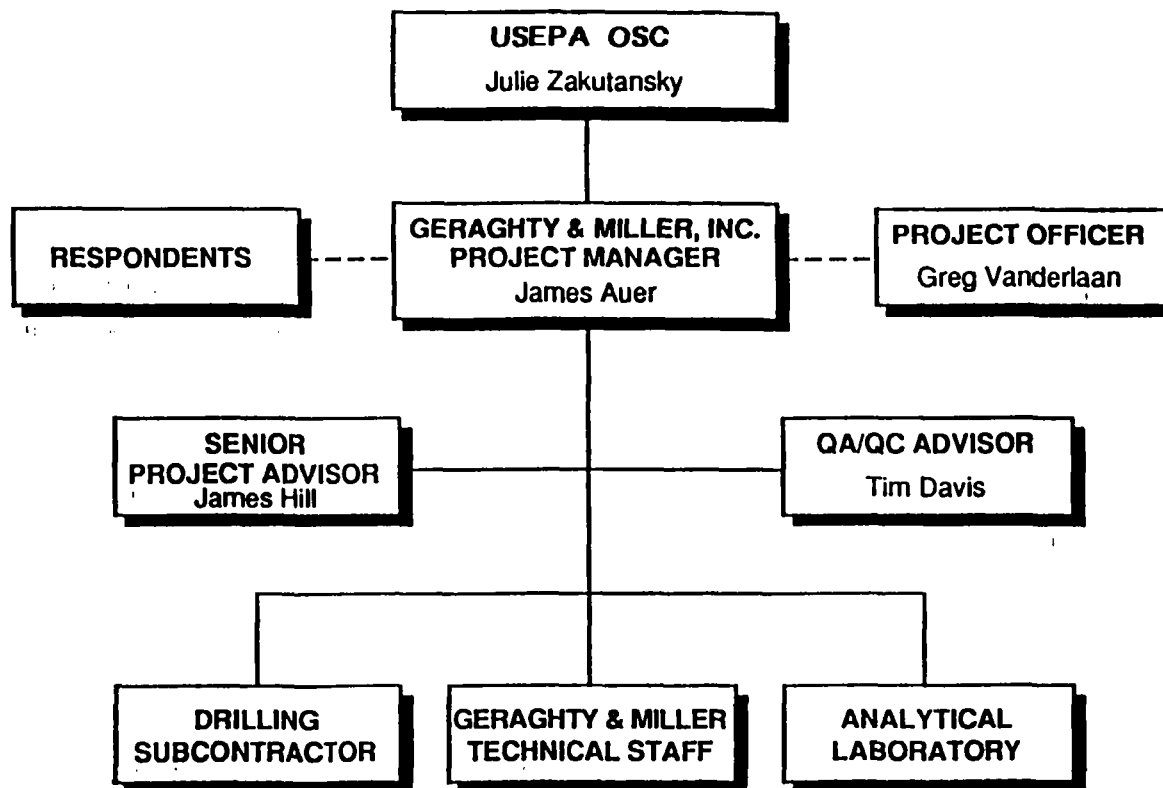


Table A3-1. Summary of Sampling and Analysis Program.

Sample Type	Field Measurements and Observations	Laboratory Parameters ²	Analytical Method	DQO Analytical Level	# of Samples	QUALITY CONTROL SAMPLES			Total # of Samples
						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	VOCs	8240	II	24	0	0	2	26
	screening using PID	PNAs	8310	II	24	0	0	2	26
	or FID ¹	PCBs	8080	II	24	0	0	2	26
Groundwater	- pH	VOCs	8240	II	22	3	5	2	32
	- Specific Conductance	PNAs	8310	II	22	3	3	2	30
	- Temperature	PCBs	8080	II	22	3	3	2	30
	- Qualitative observation of color and turbidity								

1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.

2 All water samples are unfiltered; VOCs = Volatile Organic Compounds; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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- **Verification Objective (DQO Level 2):** This objective for data quality is available for data collection activities that require qualitative and/or quantitative verification of a "select portion of sample findings" (10% or more) that were acquired using non-rigorous methods of analysis and quality assurance. This quality objective is intended to give the decision-maker (Project Manager and/or OSC) a level of confidence for a select portion of the preliminary data. Generally the methods used for verification are more rigorous, as to analytical methodology and quality assurance. Only those verification methods that are analyte specific can be considered for this quality objective. This objective is generally applied, but not limited to, the following activities: physical and/or chemical properties of samples; extent and degree of contamination; verification of pollutant plume definition in groundwater; verification of health and safety assessment; verification of pollutant identification; and verification of cleanup. The soil and groundwater samples that will be submitted to the laboratory for analysis as part of the Phase II Site Investigation will follow the DQO Level 2 verification objective.
- **Definitive Objective (DQO Level 3):** This objective for data quality is available for data collection activities that require a high degree of qualitative and quantitative accuracy of all findings using rigorous methods of analysis and quality assurance for "critical samples" (i.e., those samples for which the data are considered essential in making a decision). This quality objective is intended to give the decision maker (Project Manager or OSC) a level of confidence for a select group of "critical samples" such that a decision can be made based on an action level with regard to: treatment; disposal; site remediation and/or removal of pollutants; health risk or environmental impact; cleanup verification; pollutant source identification; delineation of contaminants; and other significant decision where an action level is concerned. Only those methods that are analyte specific can be used for this quality objective. No DQO Level 3 data will be collected during the Phase II Site Investigation.



Table B1-1. Summary of Samples and Matrices.

Sample Type	Field Measurements and Observations	Laboratory Parameters ²	Analytical Method	DQO Analytical Level	# of Samples	QUALITY CONTROL SAMPLES			Total # of Samples
						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	BETX	8240	II	20	0	0	1	21
	screening using PID	PNAs	8310	II	20	0	0	1	21
	or FID ¹	PCBs	8080	II	20	0	0	1	21
Groundwater	- pH	BETX	8240	II	20	2	4	1	27
	- Specific Conductance	PNAs	8310	II	20	2	2	1	25
	- Temperature	PCBs	8080	II	20	2	2	1	25
	- Qualitative observation of color and turbidity								

- 1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.
- 2 All water samples are unfiltered; BETX = benzene, ethylbenzene, toluene and xylenes; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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ACETONE

Synonyms: Dimethyl ketone, Ketone propane, 2-Propanone

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):**

250 ppm

Short-Term Exposure Limit:

1,000 ppm

IDLH Level:

20,000 ppm

Physical Description:

Colorless liquid with fragrant, mint-like odor

Odor Threshold:

Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Workers should wash promptly when skin becomes wet.

Remove: Remove clothing immediately if it becomes wet.

Routes of Entry:

Inhalation, ingestion, skin and/or eye contact.

Symptoms:

Irritation of eyes, nose, and throat; headache and dizziness; dermatitis.

First Aid:

Eyes: Immediately wash the eyes with large amounts of water. Get medical attention immediately.

Skin: Immediately wash with soap and water; if chemical penetrates clothing, remove clothing and wash with soap and water. Get medical attention immediately.

Target Organs:

Respiratory system, skin.



BENZENE

Synonyms:	Benzol, Phenol hydride	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1 ppm	
Short-Term Exposure Limit:	5 ppm	
IDLH Level:	3,000 ppm	
Physical Description:	Colorless to light-yellow liquid with an aromatic odor.	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	Workers should wash promptly with soap when skin becomes contaminated.
	Remove:	Remove clothing immediately if it become wet.
Routes of Entry:	Inhalation, ingestion, skin/eye contact, skin absorption.	
Symptoms:	Irritation of eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, lassitude, anorexia; dermatitis, depression.	
First Aid:	Eye:	Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes, lifting eyelids. Get medical attention immediately.
	Skin:	Promptly wash skin with soap and water.



BENZENE (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once; perform mouth-to-mouth resuscitation of breathing has stopped.

Target Organs:

Skin, bone marrow, eyes, respiratory system, central nervous system.



2-BUTANONE

Synonyms:	Ethyl methyl ketone, MEK
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	200 ppm
Short-Term Exposure Limit:	300 ppm
IDLH Level:	3,000 ppm
Physical Description:	Colorless liquid with moderately sharp fragrant, mint-like odor.
Odor Threshold:	Not Available
Personal Protection and Sanitation:	<p>Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</p> <p>Goggles: Wear eye protection to prevent reasonable probability of eye contact.</p> <p>Remove: Promptly remove any non-impervious clothing that becomes contaminated.</p> <p>Provide: Provide eyewash.</p>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Irritation of eyes and nose; headache; dizziness, vomiting.
First Aid:	<p>Eyes: Immediately wash eyes with large amounts of water.</p> <p>Skin: Immediately wash contaminated skin with water.</p> <p>Breath: Move exposed person to fresh air immediately.</p> <p>Swallow: Immediately get medical attention.</p>
Target Organs:	Central nervous system, lungs.



1,2-DICHLOROETHANE (trans)

Synonyms: Ethylene dichloride, 1,2-dichloroethane, ethylene chloride, glycol dichloride

Permissible Exposure Limit/Threshold Limit Value (PEL/TLV): 1 ppm

Short-Term Exposure Limit: 2 ppm

IDLH Level: 1,000 ppm

Physical Description: Colorless liquid with pleasant, chloroform-like odor (decomposes slowly, becomes acidic & darkens in color)

Odor Threshold: Not Available.

Personal Protection and Sanitation:

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: To prevent reasonable probability of eye contact.

Wash: Promptly when skin becomes contaminated.

Remove: Immediately remove any clothing that becomes wet to avoid flammability hazard.

Routes of Entry: Inhalation, absorption, ingestion, skin/eye contact.

Symptoms: Central nervous system, depression, nausea, vomiting, dermatitis, eye irritation, corneal opacity.

First Aid:

Eyes: Irrigate immediately.

Skin: Wash promptly with soap and water.

Breath: Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.

Swallow: Get medical attention immediately.

Target Organs: Central nervous system, eyes, liver, kidneys, skin.



ETHYLBENZENE

Synonyms: Ethylbenzol, Phenylethane

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 100 ppm

Short-Term Exposure Limit: 125 ppm

IDLH Level: 2,000 ppm

Physical Description: Colorless liquid with an aromatic odor.

Odor Threshold: Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Wash promptly when skin becomes contaminated.

Remove: Remove clothing immediately if it becomes wet to avoid flammability hazard.

Routes of Entry: Inhalation, ingestion, skin/eye contact.

Symptoms: Irritation of eyes, mucous membranes; headache, dermatitis, coma.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly flush impacted skin with water.

Breath: Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.

Swallow: Get medical attention immediately.

Target Organs: Eyes, upper respiratory system, skin, central nervous system.



LEAD

Synonyms:	Lead metal, plumbum
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	0.1 ppm (particulate)
Short-Term Exposure Limit:	Not available.
IDLH Level:	700 ppm (particulate)
Physical Description:	A heavy, soft, grey solid metal.
Odor Threshold:	Not Available.
Personal Protection and Sanitation:	<div><div>Clothing:</div><div>Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</div><div>Goggles:</div><div>Wear eye protection to prevent reasonable probability of eye contact.</div><div>Wash:</div><div>Wash at the end of each work shift.</div><div>Remove:</div><div>Immediately remove any non-impervious clothing that becomes contaminated.</div></div>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Weakness, lassitude; facial pallor; malnutrition, constipation, abdominal pain; tremors; irritated eyes; hypotension.
First Aid:	<div><div>Eyes:</div><div>Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes.</div><div>Skin:</div><div>Promptly flush contaminated skin with soap and water. If irritation persists after washing, get medical attention.</div><div>Breath:</div><div>Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.</div></div>



LEAD (continued)

Target Organs: Kidneys, blood, central nervous system, gastrointestinal tract



POLYNUCLEAR AROMATIC HYDROCARBONS

Synonyms: PNAs, PAHs, PPAHs, and POMs

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):**

0.2 ppm

Short-Term Exposure Limit: Not available.

IDLH Level: Not available.

Physical Description: Not available.

Odor Threshold: Not Available.

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: At the end of each work shift.

Remove: Immediately remove any clothing that becomes contaminated.

Routes of Entry: Inhalation of particulates, vapors.



POLYCHLORINATED BIPHENYLS

Synonyms:	PCBs, Aroclor, Phenoclor, Chlorodiphenyl	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1.0 ppm (skin)	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10 ppm	
Physical Description:	Colorless to light colored, viscous liquid with a mild hydrocarbon odor.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent any possible skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent any reasonable probability of eye contact.
	Wash:	Immediate wash skin if it becomes contaminated.
	Remove:	Immediately remove any non-impervious clothing if it becomes wet and promptly if it is non-impervious clothing that becomes contaminated.
Routes of Entry:	Absorption.	
Symptoms:	Chloracne, eye irritation, impairment of liver, and neurobehavioral symptoms.	
First Aid:	Eyes:	Immediately wash the eyes with large amounts of water occasionally lifting upper and lower eyelids. Get immediate medical attention.
	Skin:	Immediately wash with soap and water.



POLYCHLORINATED BIPHENYLS (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once and perform mouth-to-mouth resuscitation if breathing stops.

Swallow: Get medical attention immediately.

Target Organs:

Skin, liver, central nervous system.



1,1,1-TRICHLOROETHANE

Synonyms:	Methyl chloroform, chloroethene	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	350 ppm	
Short-Term Exposure Limit:	450 ppm	
IDLH Level:	1,000 ppm	
Physical Description:	Colorless liquid with a mild, chloroform-like odor.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent any possibility of eye contact.
	Wash:	Promptly when skin becomes contaminated.
	Remove:	Promptly remove any non-impervious wet clothing that becomes contaminated.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Headache, lassitude, central nervous system, depression, poor equilibrium, eye irritation, cardiac arrhythmias.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash with soap and water.
	Breath:	Move exposed person to fresh air; perform artificial respiration if necessary and get medical attention immediately.
	Swallow:	Immediately get medical attention.
Target Organs:	Respiratory system, skin.	



TRICHLOROFLUOROMETHANE

Synonyms:	Freon 11, monofluorotrichloromethane, trichloromonofluoromethane, refrigerant 11, fluorotrichloromethane	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1,000 ppm	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10,000 ppm	
Physical Description:	Colorless to water-white, nearly odorless liquid or gas (above 75°F).	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent any possibility of eye contact.
	Remove:	Promptly remove any non-impervious wet clothing that becomes contaminated.
	Provide:	Eyewash.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Incoordination, tremors, dermatitis, frostbite, cardiac arrhythmias, cardiac arrest.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash contaminated skin with water.
	Breath:	Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.



TRICHLOROFLUOROMETHANE (continued)

First Aid (continued): Swallow: Immediately get medical attention.

Target Organs: Cardiovascular system, skin.



XYLENES

Synonyms: Dimethylbenzene

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 100 ppm

Short-Term Exposure Limit: 150 ppm

IDLH Level: 1,000 ppm

Physical Description: Colorless liquids with an aromatic odor.

Odor Threshold: Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Promptly wash if contamination occurs.

Remove: Immediately remove any clothing that becomes wet to avoid flammable hazards.

Routes of Entry: Inhalation, ingestion, skin/eye contact, skin absorption.

Symptoms: Dizziness, excitement, drowsiness; irritation of eyes, nose, and throat; nausea, vomiting; dermatitis.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly wash with soap and water.

Breath: Move exposed person to fresh air at once. If breathing has stopped, provide mouth-to-mouth resuscitation.

Swallow: Get medical attention immediately.

Target Organs: Central nervous system, eyes, gastrointestinal tract, liver, kidneys, skin



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3.2 AERIAL SURVEYING AND LOCATION AND ELEVATION SURVEYING

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3.4 DEVELOPMENT OF REMOVAL ALTERNATIVE

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3.5 PRELIMINARY ASSESSMENT OF POTENTIAL REMOVAL ACTIONS

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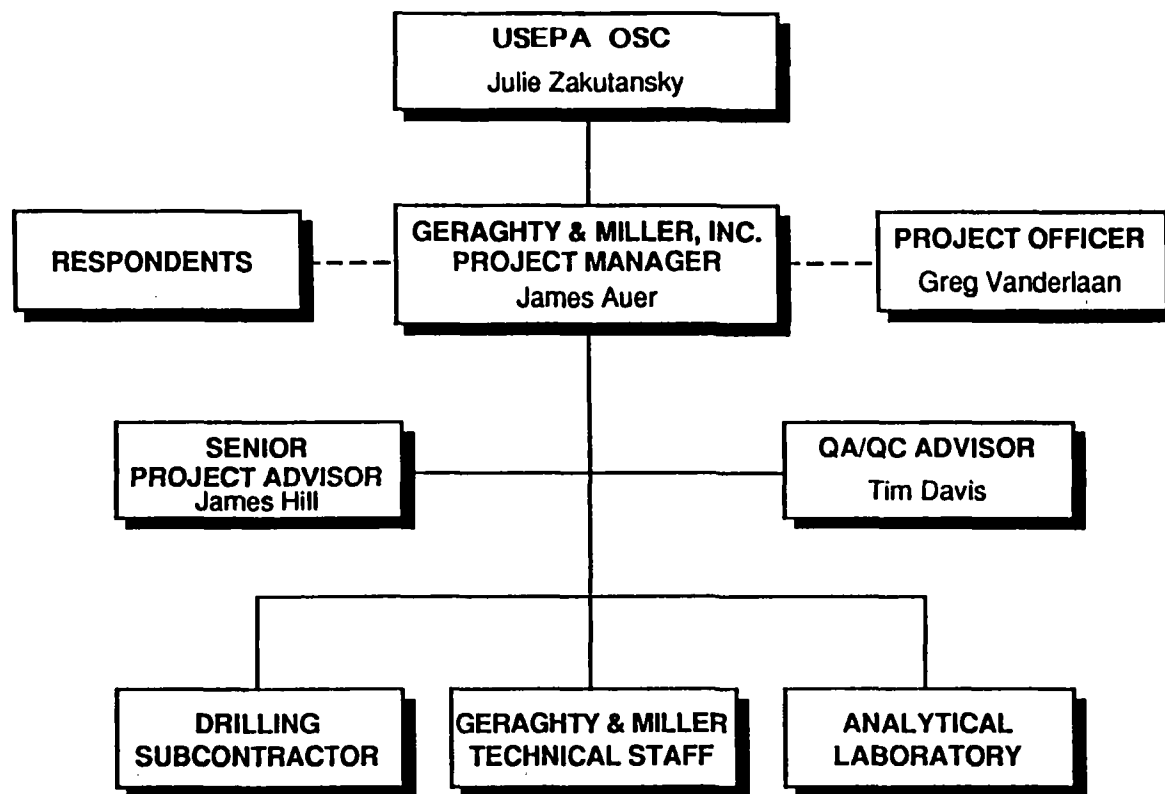
3.5.1 Production Recovery System

Groundwater at the Navistar/BNR/IIR Site is believed to have been affected as a result of former site operations, notably a diesel fuel release from an aboveground storage tank. The results of previous groundwater sampling have revealed the presence of dissolved BETX (benzene, ethylbenzene, toluene, and xylene) and PNAs, along with a floating layer of hydrocarbons, or non-aqueous phase liquid (NAPL).

Active recovery of the NAPL would require an engineered system that includes each of the following elements:

- NAPL recovery.



**PROJECT TEAM ORGANIZATION**

PHASE II SITE INVESTIGATION WORK PLAN
NAVISTAR/BURLINGTON NORTHERN RAILROAD
IOWA INTERSTATE RAILROAD PROPERTIES
ROCK ISLAND, ILLINOIS

FIGURE

5-1

Table A3-1. Summary of Sampling and Analysis Program.

Sample Type	Field Measurements and Observations	Laboratory Parameters ²	Analytical Method	DQO Analytical Level	# of Samples	QUALITY CONTROL SAMPLES			Total # of Samples
						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	VOCs	8240	II	24	0	0	2	26
	screening using PID	PNAs	8310	II	24	0	0	2	26
	or FID ¹	PCBs	8080	II	24	0	0	2	26
Groundwater	- pH	VOCs	8240	II	22	3	5	2	32
	- Specific Conductance	PNAs	8310	II	22	3	3	2	30
	- Temperature	PCBs	8080	II	22	3	3	2	30
	- Qualitative observation of color and turbidity								

- 1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.
- 2 All water samples are unfiltered; VOCs = Volatile Organic Compounds; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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- **Verification Objective (DQO Level 2):** This objective for data quality is available for data collection activities that require qualitative and/or quantitative verification of a "select portion of sample findings" (10% or more) that were acquired using non-rigorous methods of analysis and quality assurance. This quality objective is intended to give the decision-maker (Project Manager and/or OSC) a level of confidence for a select portion of the preliminary data. Generally the methods used for verification are more rigorous, as to analytical methodology and quality assurance. Only those verification methods that are analyte specific can be considered for this quality objective. This objective is generally applied, but not limited to, the following activities: physical and/or chemical properties of samples; extent and degree of contamination; verification of pollutant plume definition in groundwater; verification of health and safety assessment; verification of pollutant identification; and verification of cleanup. The soil and groundwater samples that will be submitted to the laboratory for analysis as part of the Phase II Site Investigation will follow the DQO Level 2 verification objective.
- **Definitive Objective (DQO Level 3):** This objective for data quality is available for data collection activities that require a high degree of qualitative and quantitative accuracy of all findings using rigorous methods of analysis and quality assurance for "critical samples" (i.e., those samples for which the data are considered essential in making a decision). This quality objective is intended to give the decision maker (Project Manager or OSC) a level of confidence for a select group of "critical samples" such that a decision can be made based on an action level with regard to: treatment; disposal; site remediation and/or removal of pollutants; health risk or environmental impact; cleanup verification; pollutant source identification; delineation of contaminants; and other significant decision where an action level is concerned. Only those methods that are analyte specific can be used for this quality objective. No DQO Level 3 data will be collected during the Phase II Site Investigation.



Table B1-1. Summary of Samples and Matrices.

Sample Type	Field Measurements and Observations	Laboratory Parameters ²	Analytical Method	DQO Analytical Level	# of Samples	QUALITY CONTROL SAMPLES			Total # of Samples
						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	BETX	8240	II	20	0	0	1	21
	screening using PID	PNAs	8310	II	20	0	0	1	21
	or FID ¹	PCBs	8080	II	20	0	0	1	21
Groundwater	- pH	BETX	8240	II	20	2	4	1	27
	- Specific Conductance	PNAs	8310	II	20	2	2	1	25
	- Temperature	PCBs	8080	II	20	2	2	1	25
	- Qualitative observation of color and turbidity								

- 1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.
- 2 All water samples are unfiltered; BETX = benzene, ethylbenzene, toluene and xylenes; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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ACETONE

Synonyms:	Dimethyl ketone, Ketone propane, 2-Propanone	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	250 ppm	
Short-Term Exposure Limit:	1,000 ppm	
IDLH Level:	20,000 ppm	
Physical Description:	Colorless liquid with fragrant, mint-like odor	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	Workers should wash promptly when skin becomes wet.
	Remove:	Remove clothing immediately if it becomes wet.
Routes of Entry:	Inhalation, ingestion, skin and/or eye contact.	
Symptoms:	Irritation of eyes, nose, and throat; headache and dizziness; dermatitis.	
First Aid:	Eyes:	Immediately wash the eyes with large amounts of water. Get medical attention immediately.
	Skin:	Immediately wash with soap and water; if chemical penetrates clothing, remove clothing and wash with soap and water. Get medical attention immediately.
Target Organs:	Respiratory system, skin.	



BENZENE

Synonyms:	Benzol, Phenol hydride	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1 ppm	
Short-Term Exposure Limit:	5 ppm	
IDLH Level:	3,000 ppm	
Physical Description:	Colorless to light-yellow liquid with an aromatic odor.	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	Workers should wash promptly with soap when skin becomes contaminated.
	Remove:	Remove clothing immediately if it become wet.
Routes of Entry:	Inhalation, ingestion, skin/eye contact, skin absorption.	
Symptoms:	Irritation of eyes, nose, respiratory system;giddiness; headache, nausea, staggered gait; fatigue, lassitude, anorexia; dermatitis, depression.	
First Aid:	Eye:	Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes, lifting eyelids. Get medical attention immediately.
	Skin:	Promptly wash skin with soap and water.



BENZENE (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once; perform mouth-to-mouth resuscitation of breathing has stopped.

Target Organs:

Skin, bone marrow, eyes, respiratory system, central nervous system.



2-BUTANONE

Synonyms:	Ethyl methyl ketone, MEK
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	200 ppm
Short-Term Exposure Limit:	300 ppm
IDLH Level:	3,000 ppm
Physical Description:	Colorless liquid with moderately sharp fragrant, mint-like odor.
Odor Threshold:	Not Available
Personal Protection and Sanitation:	<div><div>Clothing:</div><div>Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</div><div>Goggles:</div><div>Wear eye protection to prevent reasonable probability of eye contact.</div><div>Remove:</div><div>Promptly remove any non-impervious clothing that becomes contaminated.</div><div>Provide:</div><div>Provide eyewash.</div></div>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Irritation of eyes and nose; headache; dizziness, vomiting.
First Aid:	<div><div>Eyes:</div><div>Immediately wash eyes with large amounts of water.</div><div>Skin:</div><div>Immediately wash contaminated skin with water.</div><div>Breath:</div><div>Move exposed person to fresh air immediately.</div><div>Swallow:</div><div>Immediately get medical attention.</div></div>
Target Organs:	Central nervous system, lungs.



1,2-DICHLOROETHANE (trans)

Synonyms:	Ethylene dichloride, 1,2-dichloroethane, ethylene chloride, glycol dichloride	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1 ppm	
Short-Term Exposure Limit:	2 ppm	
IDLH Level:	1,000 ppm	
Physical Description:	Colorless liquid with pleasant, chloroform-like odor (decomposes slowly, becomes acidic & darkens in color)	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent reasonable probability of eye contact.
	Wash:	Promptly when skin becomes contaminated.
	Remove:	Immediately remove any clothing that becomes wet to avoid flammability hazard.
Routes of Entry:	Inhalation, absorption, ingestion, skin/eye contact.	
Symptoms:	Central nervous system, depression, nausea, vomiting, dermatitis, eye irritation, corneal opacity.	
First Aid:	Eyes:	Irrigate immediately.
	Skin:	Wash promptly with soap and water.
	Breath:	Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.
	Swallow:	Get medical attention immediately.
Target Organs:	Central nervous system, eyes, liver, kidneys, skin.	



ETHYLBENZENE

Synonyms: Ethylbenzol, Phenylethane

Permissible Exposure Limit/Threshold Limit Value (PEL/TLV): 100 ppm

Short-Term Exposure Limit: 125 ppm

IDLH Level: 2,000 ppm

Physical Description: Colorless liquid with an aromatic odor.

Odor Threshold: Not Available

Personal Protection and Sanitation:

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Wash promptly when skin becomes contaminated.

Remove: Remove clothing immediately if it becomes wet to avoid flammability hazard.

Routes of Entry: Inhalation, ingestion, skin/eye contact.

Symptoms: Irritation of eyes, mucous membranes; headache, dermatitis, coma.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly flush impacted skin with water.

Breath: Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.

Swallow: Get medical attention immediately.

Target Organs: Eyes, upper respiratory system, skin, central nervous system.



LEAD

Synonyms:	Lead metal, plumbum
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	0.1 ppm (particulate)
Short-Term Exposure Limit:	Not available.
IDLH Level:	700 ppm (particulate)
Physical Description:	A heavy, soft, grey solid metal.
Odor Threshold:	Not Available.
Personal Protection and Sanitation:	<div><div>Clothing:</div><div>Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</div><div>Goggles:</div><div>Wear eye protection to prevent reasonable probability of eye contact.</div><div>Wash:</div><div>Wash at the end of each work shift.</div><div>Remove:</div><div>Immediately remove any non-impervious clothing that becomes contaminated.</div></div>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Weakness, lassitude; facial pallor; malnutrition, constipation, abdominal pain; tremors; irritated eyes; hypotension.
First Aid:	<div><div>Eyes:</div><div>Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes.</div><div>Skin:</div><div>Promptly flush contaminated skin with soap and water. If irritation persists after washing, get medical attention.</div><div>Breath:</div><div>Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.</div></div>



LEAD (continued)

Target Organs: Kidneys, blood, central nervous system, gastrointestinal tract



POLYNUCLEAR AROMATIC HYDROCARBONS

Synonyms:	PNAs, PAHs, PPAHs, and POMs	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	0.2 ppm	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	Not available.	
Physical Description:	Not available.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	At the end of each work shift.
	Remove:	Immediately remove any clothing that becomes contaminated.
Routes of Entry:	Inhalation of particulates, vapors.	



POLYCHLORINATED BIPHENYLS

Synonyms:	PCBs, Aroclor, Phenoclor, Chlorodiphenyl	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1.0 ppm (skin)	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10 ppm	
Physical Description:	Colorless to light colored, viscous liquid with a mild hydrocarbon odor.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent any possible skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent any reasonable probability of eye contact.
	Wash:	Immediate wash skin if it becomes contaminated.
	Remove:	Immediately remove any non-impervious clothing if it becomes wet and promptly if it is non-impervious clothing that becomes contaminated.
Routes of Entry:	Absorption.	
Symptoms:	Chloracne, eye irritation, impairment of liver, and neurobehavioral symptoms.	
First Aid:	Eyes:	Immediately wash the eyes with large amounts of water occasionally lifting upper and lower eyelids. Get immediate medical attention.
	Skin:	Immediately wash with soap and water.



POLYCHLORINATED BIPHENYLS (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once and perform mouth-to-mouth resuscitation if breathing stops.

Swallow: Get medical attention immediately.

Target Organs:

Skin, liver, central nervous system.



1,1,1-TRICHLOROETHANE

Synonyms:	Methyl chloroform, chloroethene	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	350 ppm	
Short-Term Exposure Limit:	450 ppm	
IDLH Level:	1,000 ppm	
Physical Description:	Colorless liquid with a mild, chloroform-like odor.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent any possibility of eye contact.
	Wash:	Promptly when skin becomes contaminated.
	Remove:	Promptly remove any non-impervious wet clothing that becomes contaminated.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Headache, lassitude, central nervous system, depression, poor equilibrium, eye irritation, cardiac arrhythmias.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash with soap and water.
	Breath:	Move exposed person to fresh air; perform artificial respiration if necessary and get medical attention immediately.
	Swallow:	Immediately get medical attention.
Target Organs:	Respiratory system, skin.	



TRICHLOROFLUOROMETHANE

Synonyms:	Freon 11, monofluorotrichloromethane, trichloromonofluoromethane, refrigerant 11, fluorotrichloromethane	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1,000 ppm	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10,000 ppm	
Physical Description:	Colorless to water-white, nearly odorless liquid or gas (above 75°F).	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent any possibility of eye contact.
	Remove:	Promptly remove any non-impervious wet clothing that becomes contaminated.
	Provide:	Eyewash.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Incoordination, tremors, dermatitis, frostbite, cardiac arrhythmias, cardiac arrest.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash contaminated skin with water.
	Breath:	Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.



TRICHLOROFLUOROMETHANE (continued)

First Aid (continued): Swallow: Immediately get medical attention.

Target Organs: Cardiovascular system, skin.



XYLENES

Synonyms: Dimethylbenzene

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 100 ppm

Short-Term Exposure Limit: 150 ppm

IDLH Level: 1,000 ppm

Physical Description: Colorless liquids with an aromatic odor.

Odor Threshold: Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Promptly wash if contamination occurs.

Remove: Immediately remove any clothing that becomes wet to avoid flammable hazards.

Routes of Entry: Inhalation, ingestion, skin/eye contact, skin absorption.

Symptoms: Dizziness, excitement, drowsiness; irritation of eyes, nose, and throat; nausea, vomiting; dermatitis.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly wash with soap and water.

Breath: Move exposed person to fresh air at once. If breathing has stopped, provide mouth-to-mouth resuscitation.

Swallow: Get medical attention immediately.

Target Organs: Central nervous system, eyes, gastrointestinal tract, liver, kidneys, skin



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3.2 AERIAL SURVEYING AND LOCATION AND ELEVATION SURVEYING

All monitoring wells completed as part of the Phase II Site Investigation will be surveyed to provide horizontal and vertical data control. Elevations will be surveyed to the nearest 0.01 ft relative to mean sea level (msl). Horizontal locations for each of the monitoring wells will be determined to the nearest foot. In addition, an aerial survey of the site and site vicinity will be conducted to develop a local site topographic map.

3.3 PHASE II SITE INVESTIGATION REPORT

Subsequent to completion of Phase II Site Investigation activities, a Phase II Site Investigation Report will be prepared. This report will describe the equipment, methods, and techniques used to perform the Phase II site investigation work and will include the raw data generated, an interpretation of the data, and recommendations for additional investigative or removal activities, as appropriate. As indicated in the order, Geraghty & Miller, on behalf of the Respondents, will also submit monthly progress reports to the USEPA. These reports will describe all significant developments during the preceding period, including the work performed and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

3.4 DEVELOPMENT OF REMOVAL ALTERNATIVE

Based on the results of subsurface investigations conducted by previous investigators and the results of the Phase II investigation, Geraghty & Miller will conduct an engineering analysis of several potentially feasible source control alternatives for the Navistar/BNR/IIR Site. A brief description of Geraghty & Miller's technical approach for completing this task is presented in the following sections. An assessment of potentially available alternatives for the site, based on our preliminary review of the available site information is presented in Section 3.5.



Means Cost Estimating Guide, and unpublished data such as quotations from equipment vendors and service suppliers, and project notes.

The O&M costs cover post-installation activities required to operate the alternative, and include the costs for labor, parts, and other materials required to provide routine maintenance of equipment. Other O&M costs to be incurred include chemical and electricity needs for system operations, water and sewer service, and administrative costs.

3.5 PRELIMINARY ASSESSMENT OF POTENTIAL REMOVAL ACTIONS

Based on a preliminary review of available site information, Geraghty & Miller has made an initial assessment of the type of removal action that may be appropriate at the Navistar/BNR/IIR Site. The discussion presented in this section is intended to provide the USEPA with an introduction to the types of technologies that will be considered in the alternatives evaluation, and the general guidelines for system selection. The assessments presented herein are preliminary in nature, and are subject to change based on the results of the additional data collection activities and the detailed alternatives evaluation.

3.5.1 Production Recovery System

Groundwater at the Navistar/BNR/IIR Site is believed to have been affected as a result of former site operations, notably a diesel fuel release from an aboveground storage tank. The results of previous groundwater sampling have revealed the presence of dissolved BETX (benzene, ethylbenzene, toluene, and xylene) and PNAs, along with a floating layer of hydrocarbons, or non-aqueous phase liquid (NAPL).

Active recovery of the NAPL would require an engineered system that includes each of the following elements:

- NAPL recovery.



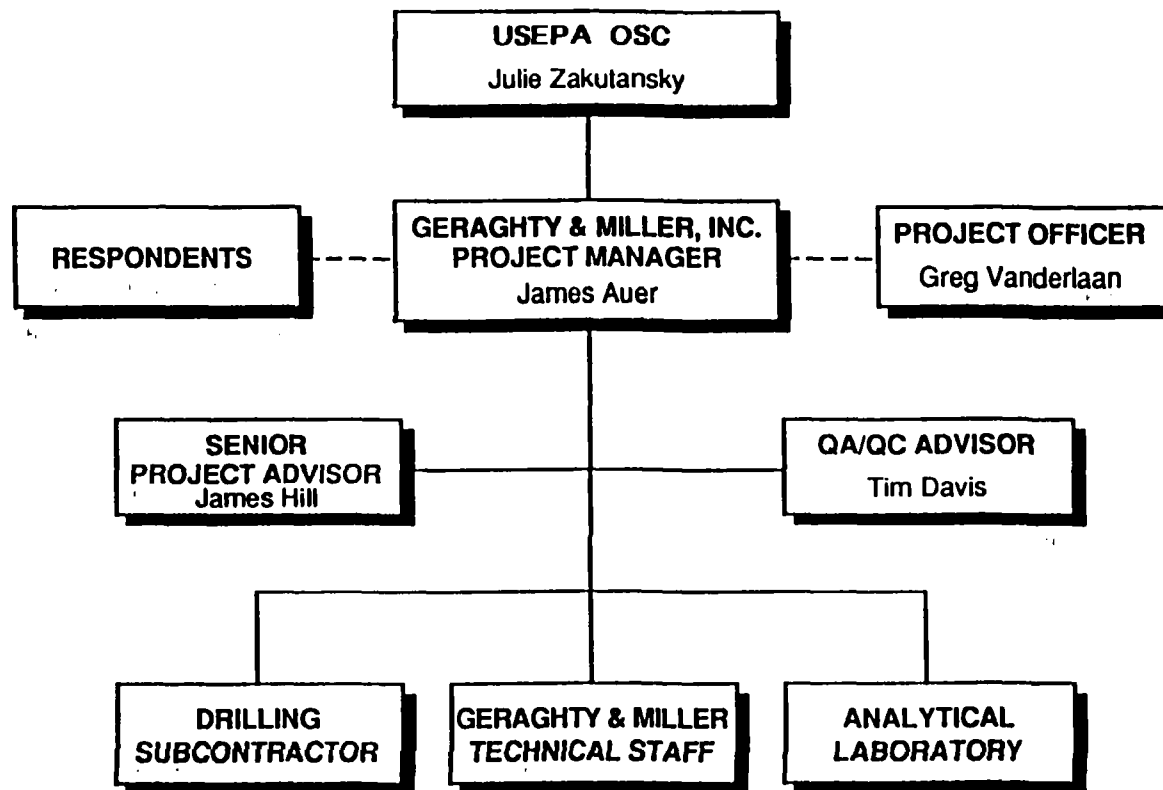


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						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	VOCs	8240	II	24	0	0	2	26
	screening using PID	PNAs	8310	II	24	0	0	2	26
	or FID ¹	PCBs	8080	II	24	0	0	2	26
Groundwater	- pH	VOCs	8240	II	22	3	5	2	32
	- Specific Conductance	PNAs	8310	II	22	3	3	2	30
	- Temperature	PCBs	8080	II	22	3	3	2	30
	- Qualitative observation of color and turbidity								

1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.

2 All water samples are unfiltered; VOCs = Volatile Organic Compounds; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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- **Verification Objective (DQO Level 2):** This objective for data quality is available for data collection activities that require qualitative and/or quantitative verification of a "select portion of sample findings" (10% or more) that were acquired using non-rigorous methods of analysis and quality assurance. This quality objective is intended to give the decision-maker (Project Manager and/or OSC) a level of confidence for a select portion of the preliminary data. Generally the methods used for verification are more rigorous, as to analytical methodology and quality assurance. Only those verification methods that are analyte specific can be considered for this quality objective. This objective is generally applied, but not limited to, the following activities: physical and/or chemical properties of samples; extent and degree of contamination; verification of pollutant plume definition in groundwater; verification of health and safety assessment; verification of pollutant identification; and verification of cleanup. The soil and groundwater samples that will be submitted to the laboratory for analysis as part of the Phase II Site Investigation will follow the DQO Level 2 verification objective.
- **Definitive Objective (DQO Level 3):** This objective for data quality is available for data collection activities that require a high degree of qualitative and quantitative accuracy of all findings using rigorous methods of analysis and quality assurance for "critical samples" (i.e., those samples for which the data are considered essential in making a decision). This quality objective is intended to give the decision maker (Project Manager or OSC) a level of confidence for a select group of "critical samples" such that a decision can be made based on an action level with regard to: treatment; disposal; site remediation and/or removal of pollutants; health risk or environmental impact; cleanup verification; pollutant source identification; delineation of contaminants; and other significant decision where an action level is concerned. Only those methods that are analyte specific can be used for this quality objective. No DQO Level 3 data will be collected during the Phase II Site Investigation.



Table B1-1. Summary of Samples and Matrices.

Sample Type	Field Measurements and Observations	Laboratory Parameters ²	Analytical Method	DQO Analytical Level	# of Samples	QUALITY CONTROL SAMPLES			Total # of Samples
						# of Field Duplicates	# of Equipment Blanks	# of MS/MSD	
Soil	- Organic vapor	BETX	8240	II	20	0	0	1	21
	screening using PID	PNAs	8310	II	20	0	0	1	21
	or FID ¹	PCBs	8080	II	20	0	0	1	21
Groundwater	- pH	BETX	8240	II	20	2	4	1	27
	- Specific Conductance	PNAs	8310	II	20	2	2	1	25
	- Temperature	PCBs	8080	II	20	2	2	1	25
	- Qualitative observation of color and turbidity								

- 1 PID/FID screening will provide qualitative information regarding the concentration of VOCs in the sample and provide information for health and safety purposes.
- 2 All water samples are unfiltered; BETX = benzene, ethylbenzene, toluene and xylenes; PNAs = polynuclear aromatic hydrocarbons; PCBs = polychlorinated biphenyls.

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ACETONE

Synonyms:	Dimethyl ketone, Ketone propane, 2-Propanone	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	250 ppm	
Short-Term Exposure Limit:	1,000 ppm	
IDLH Level:	20,000 ppm	
Physical Description:	Colorless liquid with fragrant, mint-like odor	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	Workers should wash promptly when skin becomes wet.
	Remove:	Remove clothing immediately if it becomes wet.
Routes of Entry:	Inhalation, ingestion, skin and/or eye contact.	
Symptoms:	Irritation of eyes, nose, and throat; headache and dizziness; dermatitis.	
First Aid:	Eyes:	Immediately wash the eyes with large amounts of water. Get medical attention immediately.
	Skin:	Immediately wash with soap and water; if chemical penetrates clothing, remove clothing and wash with soap and water. Get medical attention immediately.
Target Organs:	Respiratory system, skin.	



BENZENE

Synonyms:	Benzol, Phenol hydride	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1 ppm	
Short-Term Exposure Limit:	5 ppm	
IDLH Level:	3,000 ppm	
Physical Description:	Colorless to light-yellow liquid with an aromatic odor.	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Wash:	Workers should wash promptly with soap when skin becomes contaminated.
	Remove:	Remove clothing immediately if it become wet.
Routes of Entry:	Inhalation, ingestion, skin/eye contact, skin absorption.	
Symptoms:	Irritation of eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, lassitude, anorexia; dermatitis, depression.	
First Aid:	Eye:	Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes, lifting eyelids. Get medical attention immediately.
	Skin:	Promptly wash skin with soap and water.



BENZENE (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once; perform mouth-to-mouth resuscitation of breathing has stopped.

Target Organs:

Skin, bone marrow, eyes, respiratory system, central nervous system.



2-BUTANONE

Synonyms:	Ethyl methyl ketone, MEK	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	200 ppm	
Short-Term Exposure Limit:	300 ppm	
IDLH Level:	3,000 ppm	
Physical Description:	Colorless liquid with moderately sharp fragrant, mint-like odor.	
Odor Threshold:	Not Available	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent reasonable probability of eye contact.
	Remove:	Promptly remove any non-impervious clothing that becomes contaminated.
	Provide:	Provide eyewash.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Irritation of eyes and nose; headache; dizziness, vomiting.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash contaminated skin with water.
	Breath:	Move exposed person to fresh air immediately.
	Swallow:	Immediately get medical attention.
Target Organs:	Central nervous system, lungs.	



1,2-DICHLOROETHANE (trans)

Synonyms:	Ethylene dichloride, 1,2-dichloroethane, ethylene chloride, glycol dichloride	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1 ppm	
Short-Term Exposure Limit:	2 ppm	
IDLH Level:	1,000 ppm	
Physical Description:	Colorless liquid with pleasant, chloroform-like odor (decomposes slowly, becomes acidic & darkens in color)	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent reasonable probability of eye contact.
	Wash:	Promptly when skin becomes contaminated.
	Remove:	Immediately remove any clothing that becomes wet to avoid flammability hazard.
Routes of Entry:	Inhalation, absorption, ingestion, skin/eye contact.	
Symptoms:	Central nervous system, depression, nausea, vomiting, dermatitis, eye irritation, corneal opacity.	
First Aid:	Eyes:	Irrigate immediately.
	Skin:	Wash promptly with soap and water.
	Breath:	Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.
	Swallow:	Get medical attention immediately.
Target Organs:	Central nervous system, eyes, liver, kidneys, skin.	



ETHYLBENZENE

Synonyms: Ethylbenzol, Phenylethane

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 100 ppm

Short-Term Exposure Limit: 125 ppm

IDLH Level: 2,000 ppm

Physical Description: Colorless liquid with an aromatic odor.

Odor Threshold: Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Wash promptly when skin becomes contaminated.

Remove: Remove clothing immediately if it becomes wet to avoid flammability hazard.

Routes of Entry: Inhalation, ingestion, skin/eye contact.

Symptoms: Irritation of eyes, mucous membranes; headache, dermatitis, coma.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly flush impacted skin with water.

Breath: Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.

Swallow: Get medical attention immediately.

Target Organs: Eyes, upper respiratory system, skin, central nervous system.



LEAD

Synonyms:	Lead metal, plumbum
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	0.1 ppm (particulate)
Short-Term Exposure Limit:	Not available.
IDLH Level:	700 ppm (particulate)
Physical Description:	A heavy, soft, grey solid metal.
Odor Threshold:	Not Available.
Personal Protection and Sanitation:	<div><div>Clothing:</div><div>Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</div><div>Goggles:</div><div>Wear eye protection to prevent reasonable probability of eye contact.</div><div>Wash:</div><div>Wash at the end of each work shift.</div><div>Remove:</div><div>Immediately remove any non-impervious clothing that becomes contaminated.</div></div>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Weakness, lassitude; facial pallor; malnutrition, constipation, abdominal pain; tremors; irritated eyes; hypotension.
First Aid:	<div><div>Eyes:</div><div>Immediately wash the eyes with large amounts of water and continue flushing for 15 minutes.</div><div>Skin:</div><div>Promptly flush contaminated skin with soap and water. If irritation persists after washing, get medical attention.</div><div>Breath:</div><div>Move exposed person to fresh air immediately. Perform mouth-to-mouth resuscitation if breathing has stopped.</div></div>



LEAD (continued)

Target Organs: Kidneys, blood, central nervous system, gastrointestinal tract



POLYNUCLEAR AROMATIC HYDROCARBONS

Synonyms: PNAs, PAHs, PPAHs, and POMs

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 0.2 ppm

Short-Term Exposure Limit: Not available.

IDLH Level: Not available.

Physical Description: Not available.

Odor Threshold: Not Available.

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: At the end of each work shift.

Remove: Immediately remove any clothing that becomes contaminated.

Routes of Entry: Inhalation of particulates, vapors.



POLYCHLORINATED BIPHENYLS

Synonyms:	PCBs, Aroclor, Phenoclor, Chlorodiphenyl	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1.0 ppm (skin)	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10 ppm	
Physical Description:	Colorless to light colored, viscous liquid with a mild hydrocarbon odor.	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent any possible skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	Wear eye protection to prevent any reasonable probability of eye contact.
	Wash:	Immediate wash skin if it becomes contaminated.
	Remove:	Immediately remove any non-impervious clothing if it becomes wet and promptly if it is non-impervious clothing that becomes contaminated.
Routes of Entry:	Absorption.	
Symptoms:	Chloracne, eye irritation, impairment of liver, and neurobehavioral symptoms.	
First Aid:	Eyes:	Immediately wash the eyes with large amounts of water occasionally lifting upper and lower eyelids. Get immediate medical attention.
	Skin:	Immediately wash with soap and water.



POLYCHLORINATED BIPHENYLS (continued)

First Aid (continued):

Breath: Move exposed person to fresh air at once and perform mouth-to-mouth resuscitation if breathing stops.

Swallow: Get medical attention immediately.

Target Organs:

Skin, liver, central nervous system.



1,1,1-TRICHLOROETHANE

Synonyms:	Methyl chloroform, chloroethene
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	350 ppm
Short-Term Exposure Limit:	450 ppm
IDLH Level:	1,000 ppm
Physical Description:	Colorless liquid with a mild, chloroform-like odor.
Odor Threshold:	Not Available.
Personal Protection and Sanitation:	<p>Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.</p> <p>Goggles: To prevent any possibility of eye contact.</p> <p>Wash: Promptly when skin becomes contaminated.</p> <p>Remove: Promptly remove any non-impervious wet clothing that becomes contaminated.</p>
Routes of Entry:	Inhalation, ingestion, skin/eye contact.
Symptoms:	Headache, lassitude, central nervous system, depression, poor equilibrium, eye irritation, cardiac arrhythmias.
First Aid:	<p>Eyes: Immediately wash eyes with large amounts of water.</p> <p>Skin: Immediately wash with soap and water.</p> <p>Breath: Move exposed person to fresh air; perform artificial respiration if necessary and get medical attention immediately.</p> <p>Swallow: Immediately get medical attention.</p>
Target Organs:	Respiratory system, skin.



TRICHLOROFLUOROMETHANE

Synonyms:	Freon 11, monofluorotrichloromethane, trichloromonofluoromethane, refrigerant 11, fluorotrichloromethane	
Permissible Exposure Limit/Threshold Limit Value (PEL/TLV):	1,000 ppm	
Short-Term Exposure Limit:	Not available.	
IDLH Level:	10,000 ppm	
Physical Description:	Colorless to water-white, nearly odorless liquid or gas (above 75°F).	
Odor Threshold:	Not Available.	
Personal Protection and Sanitation:	Clothing:	Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.
	Goggles:	To prevent any possibility of eye contact.
	Remove:	Promptly remove any non-impervious wet clothing that becomes contaminated.
	Provide:	Eyewash.
Routes of Entry:	Inhalation, ingestion, skin/eye contact.	
Symptoms:	Incoordination, tremors, dermatitis, frostbite, cardiac arrhythmias, cardiac arrest.	
First Aid:	Eyes:	Immediately wash eyes with large amounts of water.
	Skin:	Immediately wash contaminated skin with water.
	Breath:	Move exposed person to fresh air immediately; perform artificial respiration if necessary and get medical attention immediately.



TRICHLOROFLUOROMETHANE (continued)

First Aid (continued): Swallow: Immediately get medical attention.

Target Organs: Cardiovascular system, skin.



XYLENES

Synonyms: Dimethylbenzene

**Permissible Exposure
Limit/Threshold Limit
Value (PEL/TLV):** 100 ppm

Short-Term Exposure Limit: 150 ppm

IDLH Level: 1,000 ppm

Physical Description: Colorless liquids with an aromatic odor.

Odor Threshold: Not Available

**Personal Protection
and Sanitation:**

Clothing: Wear Tyvek coveralls and nitrile gloves to prevent repeated or prolonged skin contact. Due to the fact that the compound will be encountered in a soil or groundwater matrix, not in its pure form, permeation rates are not necessary.

Goggles: Wear eye protection to prevent reasonable probability of eye contact.

Wash: Promptly wash if contamination occurs.

Remove: Immediately remove any clothing that becomes wet to avoid flammable hazards.

Routes of Entry: Inhalation, ingestion, skin/eye contact, skin absorption.

Symptoms: Dizziness, excitement, drowsiness; irritation of eyes, nose, and throat; nausea, vomiting; dermatitis.

First Aid:

Eyes: Immediately wash eyes with large amounts of water.

Skin: Promptly wash with soap and water.

Breath: Move exposed person to fresh air at once. If breathing has stopped, provide mouth-to-mouth resuscitation.

Swallow: Get medical attention immediately.

Target Organs: Central nervous system, eyes, gastrointestinal tract, liver, kidneys, skin

